

ProLight PACB-9FxL-xC4P
9W COB Light-Engine LEDs
Technical Datasheet
Version: 1.3

ProLight Opto ® ProEngine Series

Features

- High flux density of lighting source
- Good color uniformity
- RoHS compliant
- Energy Star binning structure, neutral white and warm white with 3 steps guarantee.
- More energy efficient than incandescent and most halogen lamps
- No UV
- Long lifetime

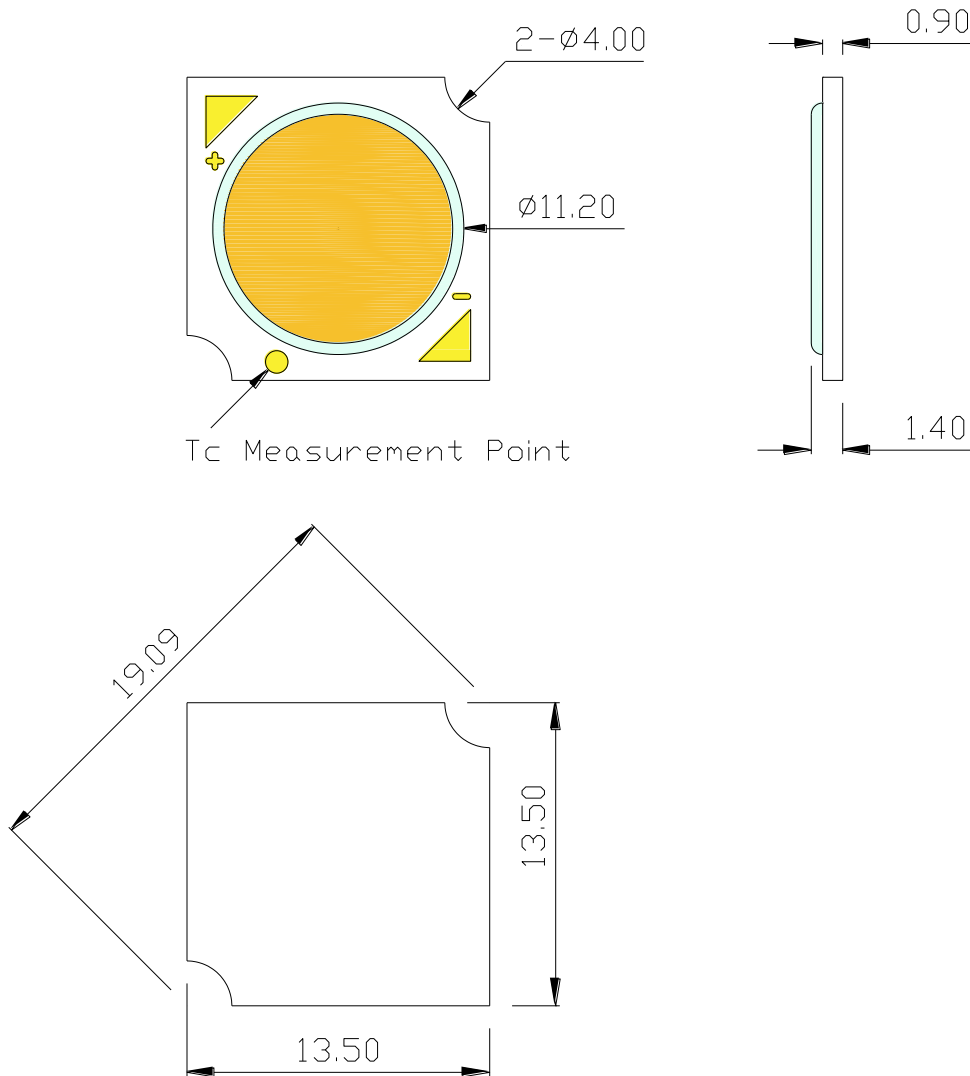
Main Applications

- Par lighting
- LED Bulb
- Ceiling lighting
- Spot lighting
- Down lighting

Introduction

- The input power is 9 Watt, the multi-chip ultra high power ProEngine Series delivers never before seen luminous flux output from a single emitter. The superficial illuminating nature of ProEngine makes them the preference in Par lighting, typical applications include commercial down lighting, LED bulb, accent lighting, ceiling lighting and spot lighting.

Emitter Mechanical Dimensions



Notes:

1. Slots in aluminum-core PCB for M3 mounting screw.
2. Solder pads are labeled "+" and "-" to denote positive and negative, respectively.
3. Drawing not to scale.
4. All dimensions are in millimeters.
5. Unless otherwise indicated, tolerances are $\pm 0.30\text{mm}$.
6. **Please do not use a force of over 0.3kgf impact or pressure on the lens of the LED, otherwise it will cause a catastrophic failure.**

*The appearance and specifications of the product may be modified for improvement without notice.

Flux Characteristics, $T_c = 25^\circ\text{C}$

Radiation Pattern	Color	Part Number COB	DC Forward Current (mA)	Luminous Flux Φ_v (lm)		CRI Minimum
				Minimum	Typical	
Lambertian	White	PACB-9FWL-BC4P	240*	1050	1170	80
			480	1950	2160	
	Neutral White	PACB-9FNL-BC4P	240*	1040	1150	80
			480	1910	2130	
	Warm White	PACB-9FVL-BC4P	240*	950	1100	80
			480	1750	2040	
		PACB-9FVL-DC4P	240*	660	780	93
			480	1230	1440	

- The mark "*" indicated product is tested and binned at the specified drive current.
- ProLight maintains a tolerance of $\pm 10\%$ on flux and power measurements.
- ProLight maintains a tolerance of ± 2 on CRI measurements.
- Please do not drive at rated current more than 1 second without proper heat sink.

Electrical Characteristics at 240mA, $T_c = 25^\circ\text{C}$

Color	Forward Voltage V_F (V)			Thermal Resistance Junction to Board ($^\circ\text{C}/\text{W}$)
	Min.	Typ.	Max.	
White	33.0	35.5	38.0	2.1
Neutral White	33.0	35.5	38.0	2.1
Warm White	33.0	35.5	38.0	2.1

- ProLight maintains a tolerance of $\pm 1\text{V}$ for Voltage measurements.

Optical Characteristics at 240mA, $T_c = 25^\circ\text{C}$

Radiation Pattern	Color	Color Temperature CCT			Total included Angle (degrees)	Viewing Angle (degrees)
		Min.	Typ.	Max.	$\theta_{0.90v}$	$2\theta_{1/2}$
Lambertian	White	4740 K	5000 K	5310 K	160	120
	Neutral White	3840 K	4000 K	4130 K	160	120
	Warm White	2650 K	2700 K	2800 K	160	120
		2860 K	2940 K	3020 K	160	120
		2960 K	3000 K	3130 K	160	120

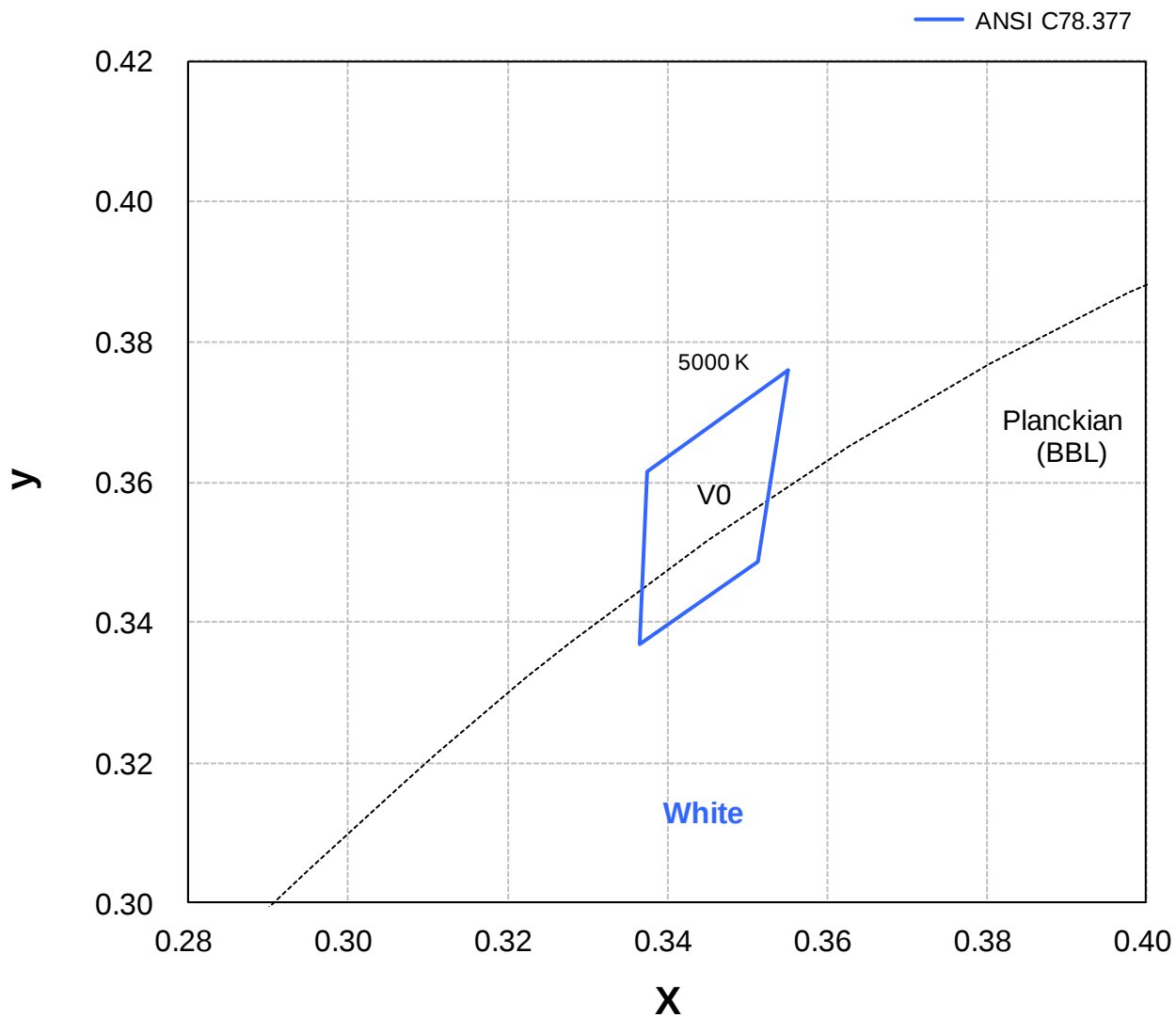
- ProLight maintains a tolerance of $\pm 5\%$ for CCT measurements.

Absolute Maximum Ratings

Parameter	White/Neutral White/Warm White
Max DC Forward Current (mA)	480
Peak Pulsed Forward Current (mA)	720 (less than 1/10 duty cycle@1KHz)
Average Forward Current (mA)	480
ESD Sensitivity (HBM per MIL-STD-883E Method 3015.7)	±2000V
LED Junction Temperature	120°C
Operating Board Temperature at Maximum DC Forward Current	-40°C - 90°C
Storage Temperature	-40°C - 120°C
Reverse Voltage	Not designed to be driven in reverse bias
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Color Bin

White Binning Structure Graphical Representation



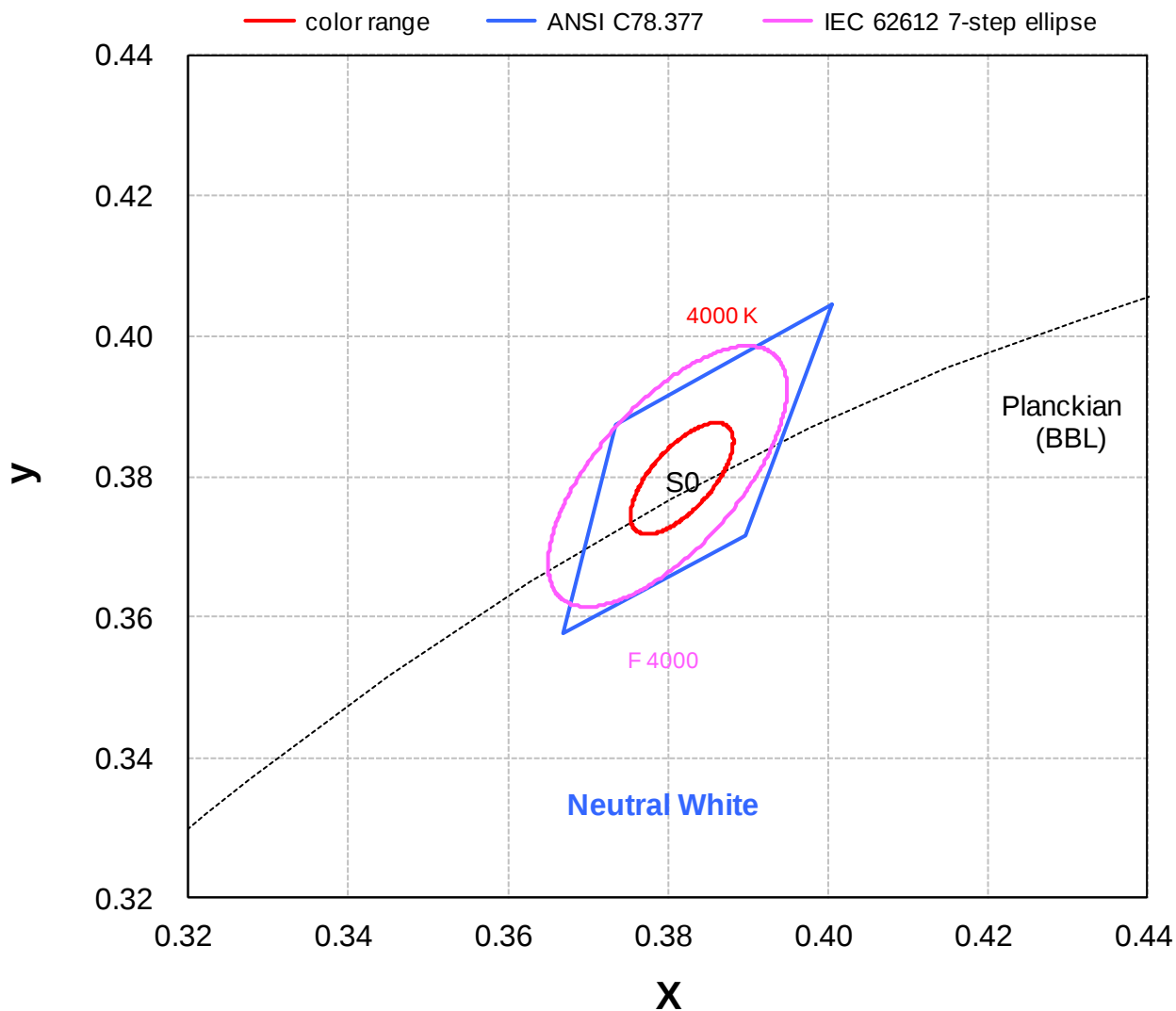
White Bin Structure

Bin Code	x	y	Typ. CCT (K)
V0	0.3551	0.3760	5000
	0.3376	0.3616	
	0.3366	0.3369	
	0.3515	0.3487	

- Tolerance on each color bin (x , y) is ± 0.01

Color Bin

Neutral White Binning Structure Graphical Representation



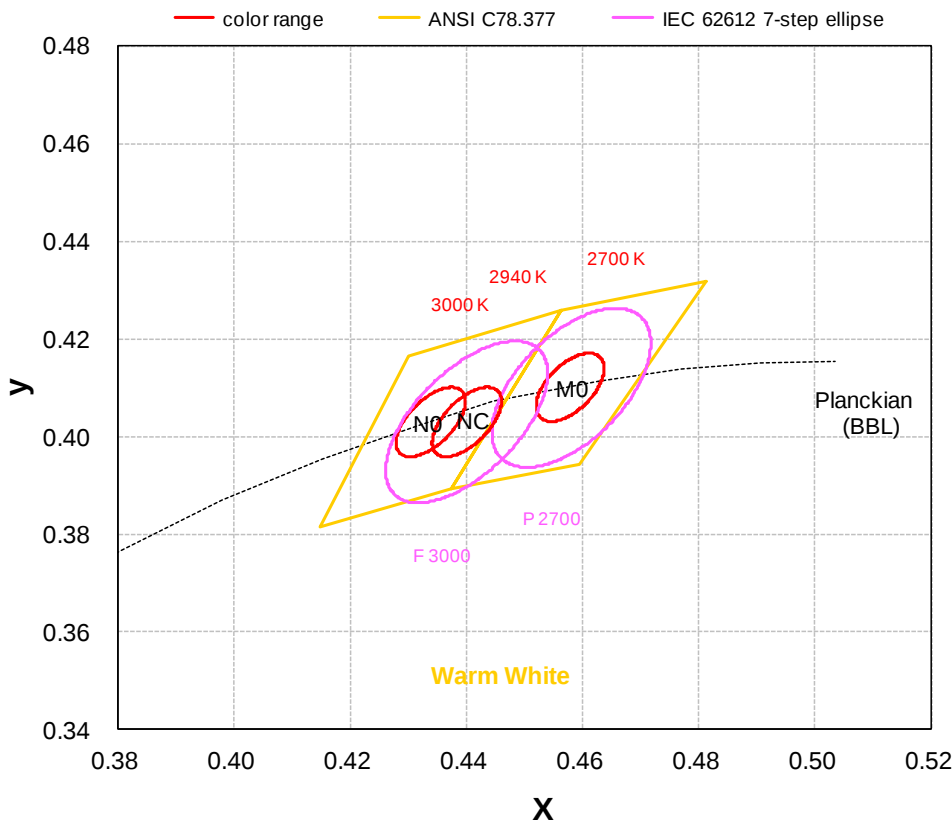
Neutral White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)
S0	x	0.3818	4000
	y	0.3797	
	a	0.00939	
	b	0.00402	
		θ°	53.72

- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.01

Color Bin

Warm White Binning Structure Graphical Representation



Warm White Bin Structure

Bin Code	Center	Oval parameter	Typ. CCT (K)	Bin Code	Center	Oval parameter	Typ. CCT (K)
M0	x	a 0.00810	2700	N0	x	a 0.00834	3000
	y	b 0.00420			y	b 0.00408	
		θ° 53.70				θ° 53.22	

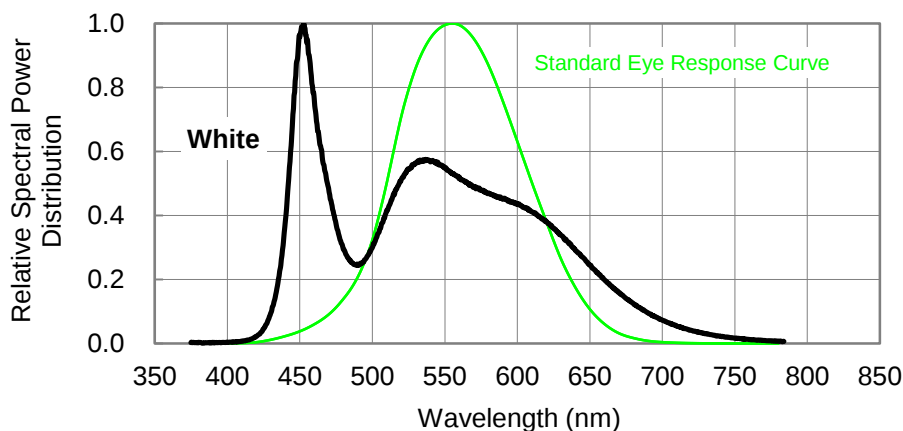
- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to ANSI C78.377.
- Tolerance on each color bin (x , y) is ± 0.01

Bin Code	Center	Oval parameter	Typ. CCT (K)
NC	x	a 0.00834	2940
	y	b 0.00408	
		θ° 53.02	

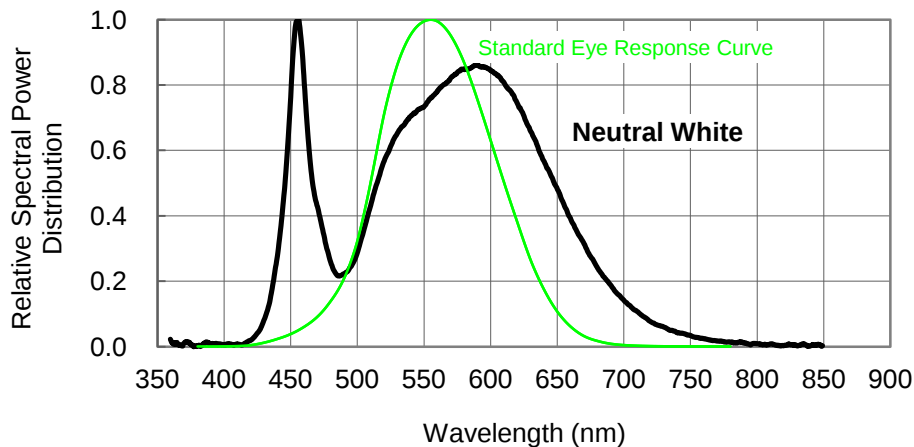
- Color range stay within MacAdam “3-step” ellipse from the chromaticity center.
- The chromaticity center refers to IEC 62612.
- Tolerance on each color bin (x , y) is ± 0.01

Color Spectrum, $T_c = 25^\circ\text{C}$

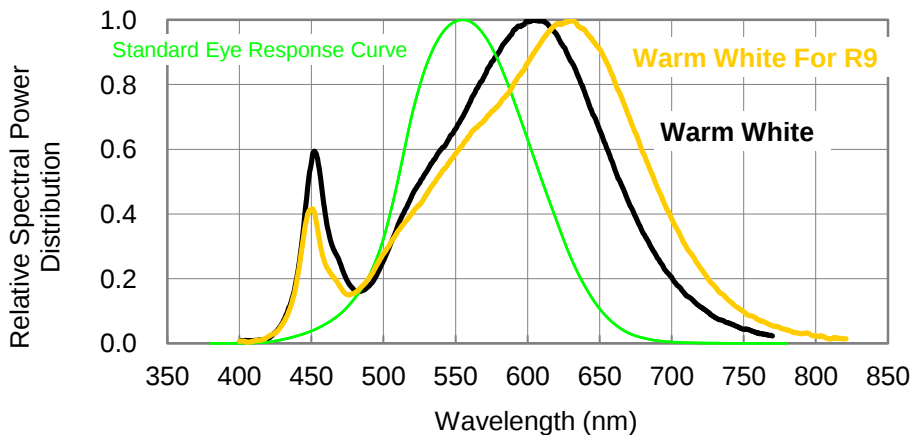
1. White



2. Neutral White



3. Warm White



Case Temperature Relative Characteristics

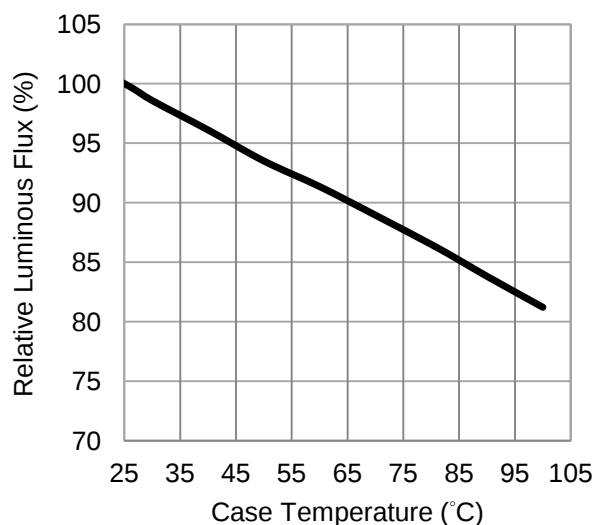


Fig 1. Case Temperature vs. Relative Luminous Flux at 240mA.

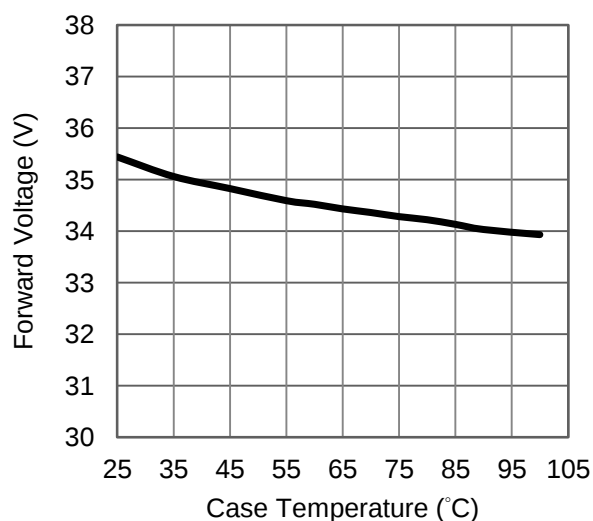


Fig 2. Case Temperature vs. Forward Voltage at 240mA.

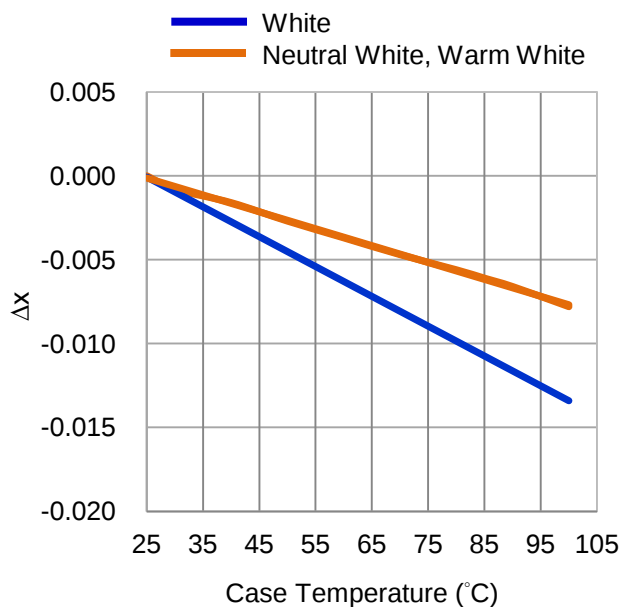


Fig 3. Case Temperature vs. Chromaticity Coordinate Δx at 240mA.

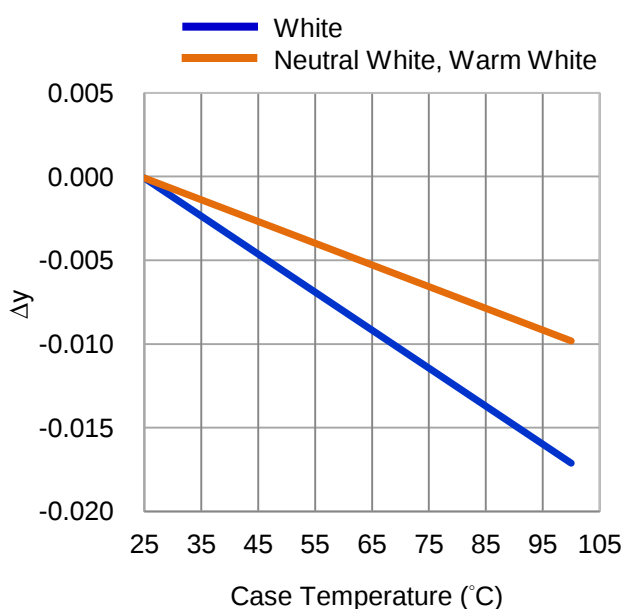


Fig 4. Case Temperature vs. Chromaticity Coordinate Δy at 240mA.

Forward Current Relative Characteristics

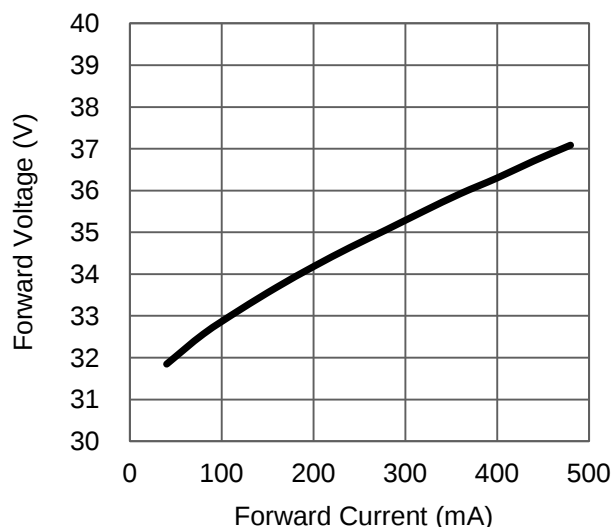


Fig 5. Forward Current vs. Forward Voltage at $T_C=25^\circ\text{C}$.

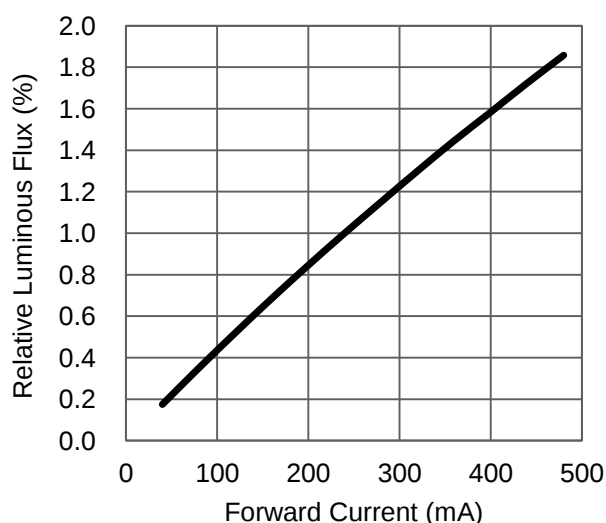


Fig 6. Forward Current vs. Relative Luminous Flux at $T_C=25^\circ\text{C}$.

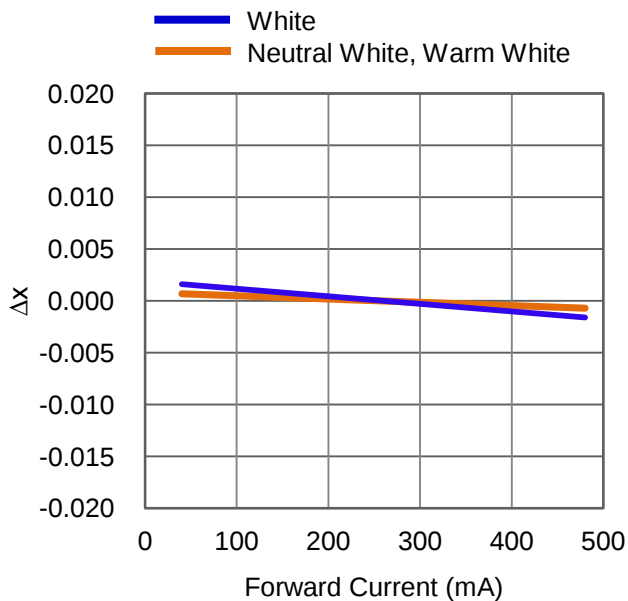


Fig 7. Forward Current vs. Chromaticity Coordinate Δx at $T_C=25^\circ\text{C}$.

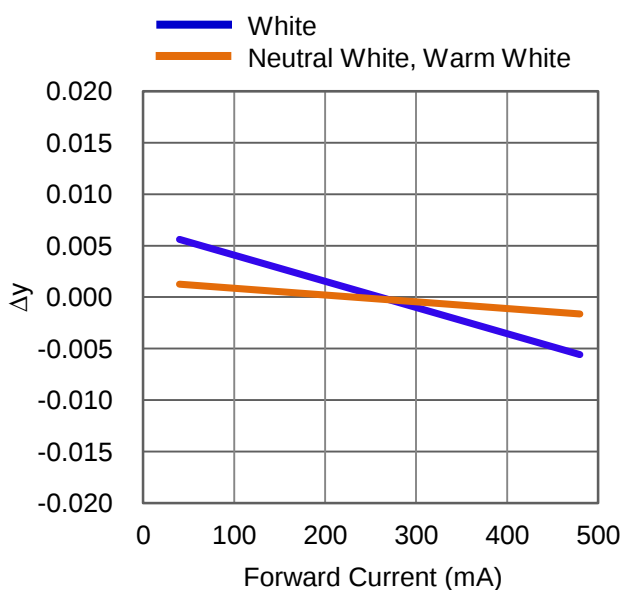


Fig 8. Forward Current vs. Chromaticity Coordinate Δy at $T_C=25^\circ\text{C}$.

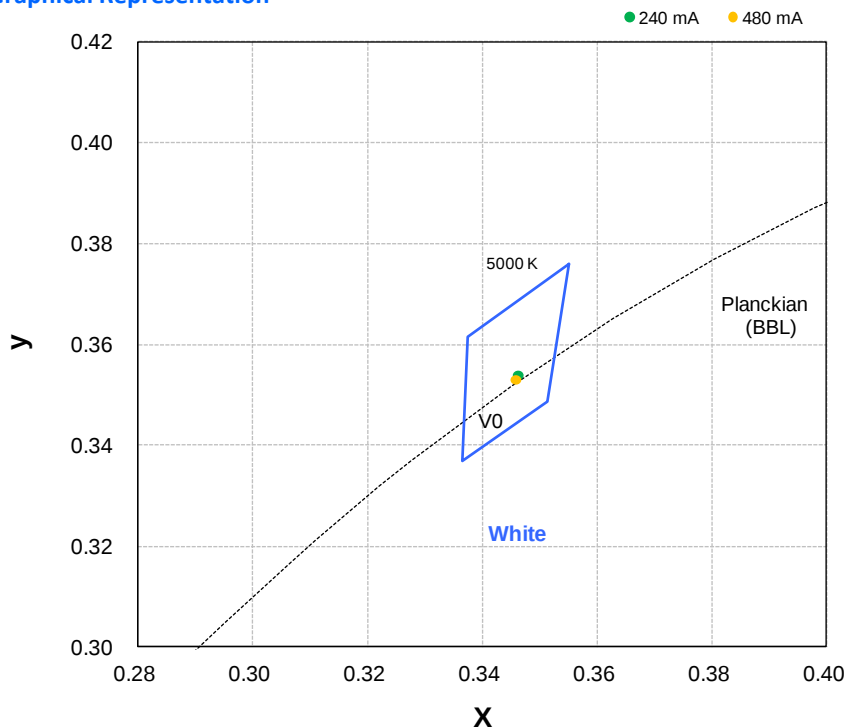
Case Temperature vs. Junction Temperature Characteristics

T _c (°C)	T _j (°C)	
	240 (mA)	480 (mA)
0	18	38
5	23	43
10	28	48
15	33	53
20	38	58
25	43	63
30	48	68
35	53	73
40	58	78
45	63	83
50	68	88
55	73	93
60	78	98
65	83	103
70	88	108
75	93	113
80	98	118
85	103	123
90	108	128

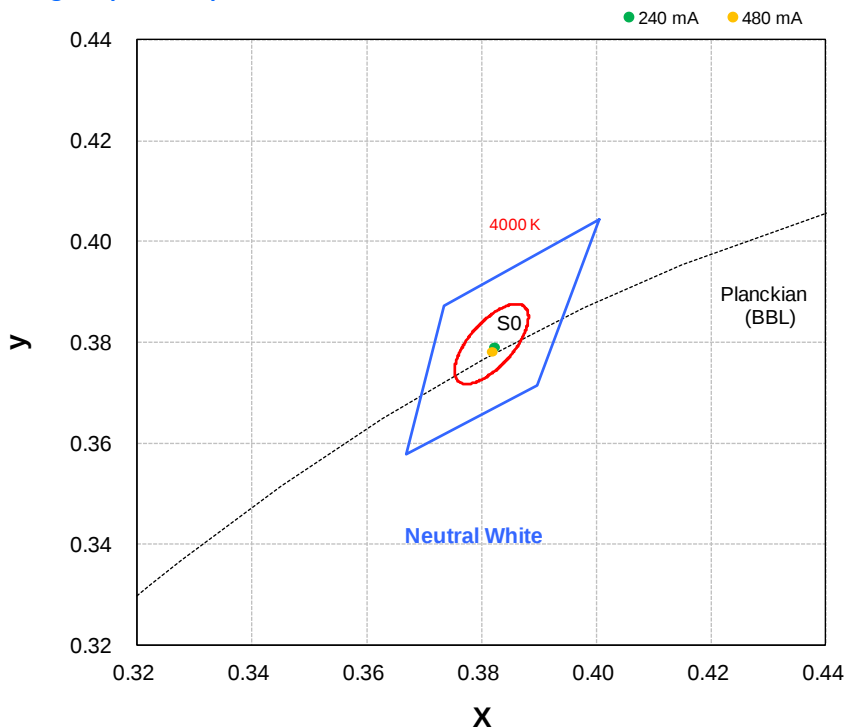
Fig 9. Case Temperature vs. Junction Temperature at 240 、480mA.

Color Coordinate vs. Forward Current, $T_c = 25^\circ\text{C}$

White Binning Graphical Representation

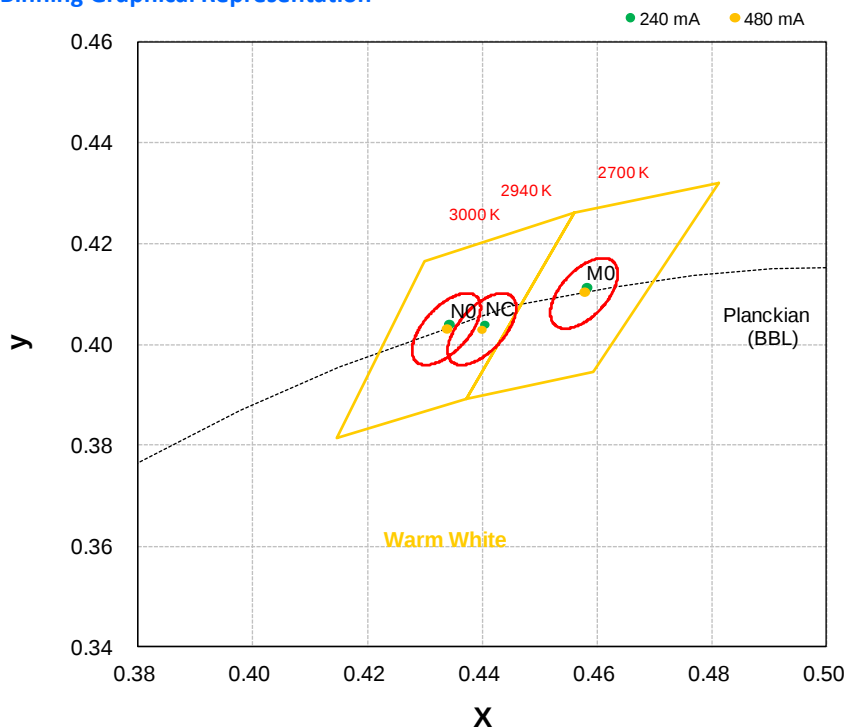


Neutral White Binning Graphical Representation



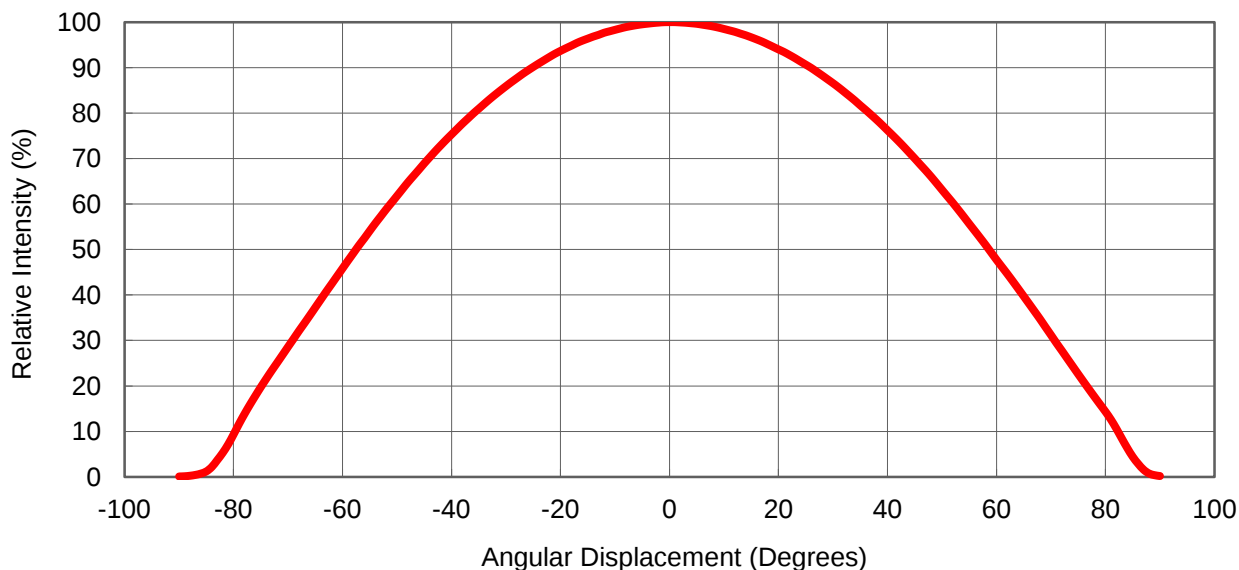
Color Coordinate vs. Forward Current, $T_c = 25^\circ\text{C}$

Warm White Binning Graphical Representation

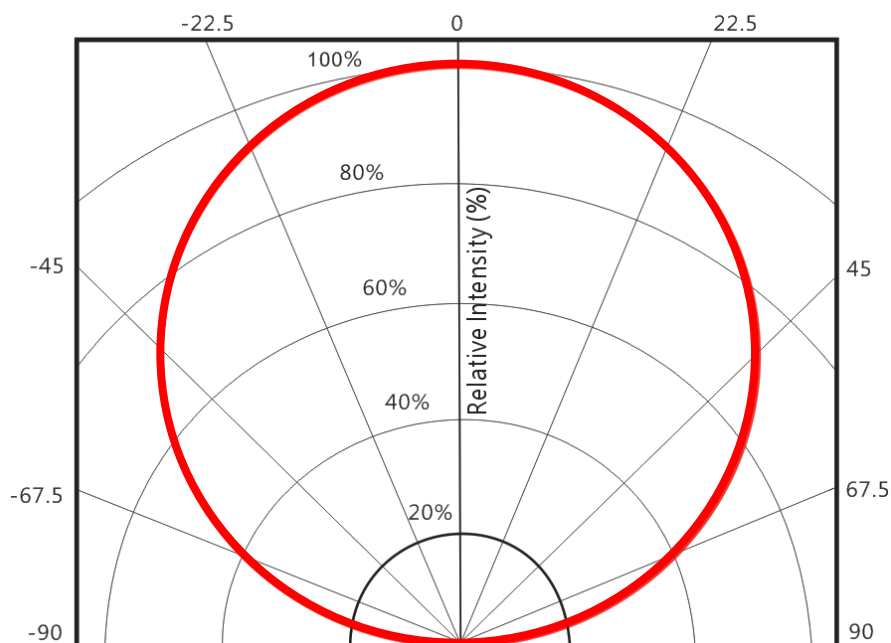


Typical Representative Spatial Radiation Pattern

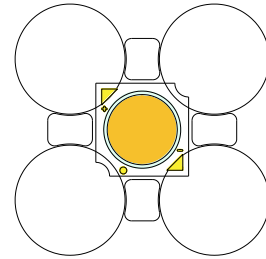
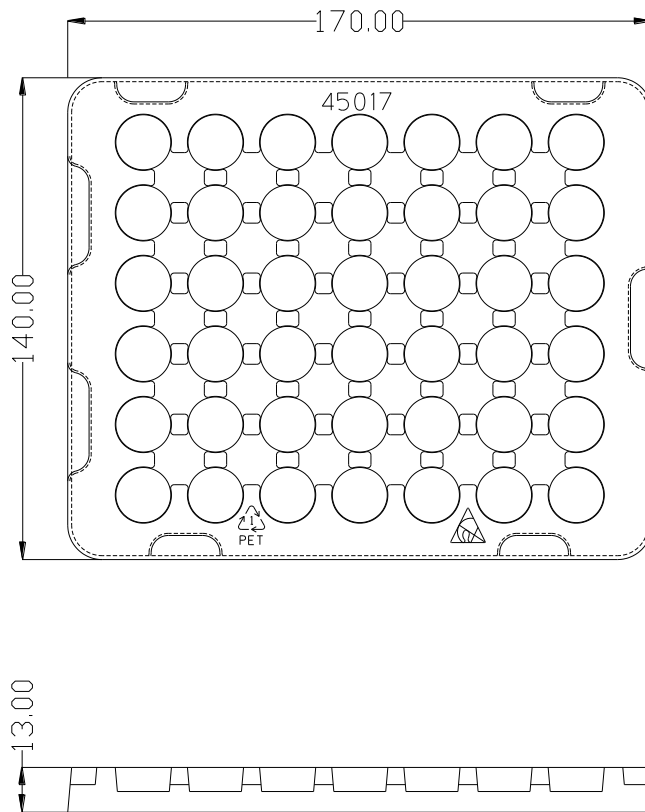
Lambertian Radiation Pattern



Polar Radiation Pattern



Packing Specifications



Product 30 pcs/tray

Notes:

1. Drawing not to scale.
2. All dimensions are in millimeters.
3. Unless otherwise indicated, tolerances are $\pm 0.20\text{mm}$.

Assembly note

Regarding the high power density of LED Array, it is strongly recommend to use thermal grease and screws.

In order to reduce thermal resistance at assembly, it is necessary to use TIM (thermal interface Material) uniformly and tighten screws on heatsink, otherwise the bad thermal resistance may cause the packages **burned out**.

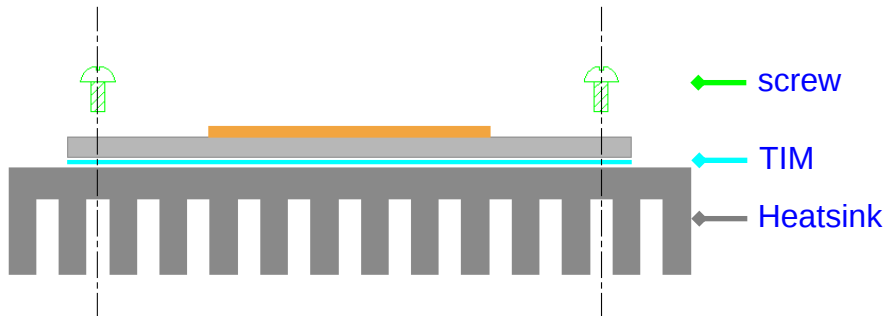


Fig 10. Reference assembly as fixing with screws

Recommended Soldering Condition

- Please use lead free and “no clean ” solders.
- Soldering shall be implemented using a soldering tip at a temperature lower than 350 °C , and shall be finished within 3.5 seconds for each pad.
- During the soldering process, put the LEDs on materials whose conductivity is poor enough not to radiate heat of soldering.
- Properly solder tin wires before soldering them to LEDs.
- Avoid touching the silicone lens with the soldering iron.
- Please prevent flux from touching to the silicone lens.
- Please solder evenly on each pad.
- Contacts number of a soldering tip should be within twice for each pad.
- Next process of soldering should be carried out after the LEDs have return to ambient temperature.

*ProLight cannot guarantee if usage exceeds these recommended conditions.

Please use it after sufficient verification is carried out on your own risk if absolutely necessary.

Precaution for Use

- The modules light output are intense enough to cause injury to human eyes if viewed directly. Precautions must be taken to avoid looking directly at the modules with unprotected eyes.
- The modules are sensitive to electrostatic discharge. Appropriate ESD protection measures must be taken when working with the modules. Non-compliance with ESD protection measures may lead to damage or destruction of the product.
- Chemical solvents or cleaning agents must not be used to clean the modules. Mechanical stress on the Emitters must be avoided. It is best to use a soft brush, damp cloth or low-pressure compressed air.
- The products should be stored away from direct light in dry location.
- The appearance, specifications and flux bin of the product may be modified for improvement without notice. Please refer to the below website for the latest datasheets.
<http://www.prolightopto.com/>

Handling of Silicone Lens LEDs

Notes for handling of silicone lens LEDs

- Please do not use a force of over 0.3kgf impact or pressure on the silicone lens, otherwise it will cause a catastrophic failure.
- Avoid touching the silicone lens and the optical area of the COB Array especially by sharp tools such as Tweezers
- Avoid touching the silicone lens especially by sharp tools such as Tweezers.
- Avoid leaving fingerprints on the silicone lens.
- Please store the LEDs away from dusty areas or seal the product against dust.
- Please do not mold over the silicone lens with another resin. (epoxy, urethane, etc)

